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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/559,757	04/27/2000	Yoshio Ozawa	04329.2306	2923

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EXAMINER

PHAM, THANH V

ART UNIT

PAPER NUMBER

2823

DATE MAILED: 11/18/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/559,757

Applicant(s)

OZAWA ET AL.

Examiner

Thanh V Pham

Art Unit

2823

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM
THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 16 September 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 8-19 is/are pending in the application.
- 4a) Of the above claim(s) 16-19 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 8-15 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____
- 4) ☐ Interview Summary (PTO-413) Paper No(s) _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 8-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over applicants' admitted prior art in combination with Hisamune US Patent No 6,414,352 B1 and Takeuchi US Patent No 5,907,183.

Re claims 8, 10 and 12, 14, in the description of the prior art of fig. 15, the applicants disclose that an insulating film containing silicon and nitrogen 2 is formed on the substrate 1; a film which must be processed and which contains silicon 3 is formed on the insulating film; those films are processed such that a portion of the insulating film is exposed to the outside; the structure obtained in the previous steps is subjected to an oxidation process.

The applicants' admitted prior art does not provide, in the oxidation step, oxidizing gas containing one of ozone and oxygen radicals.

The Hisamune reference discloses oxidation processes are required after forming the gates and recognizes that the oxygen radical created within a furnace, while proceeding the conventional oxidation step, would diverge through the separating regions and the known "gate bird's beak" exists (col. 2, line 55 - col. 3, line29).

To employ the oxidation process with conventional oxidizing gas containing one of ozone and oxygen radicals of Hisamune to the oxidation process of applicants' admitted prior art would have been obvious to one of ordinary skill in the art as the oxidizing gas containing one of ozone and oxygen radicals as recognized as conventional by Hisamune would be selected in accordance with the oxidation step as taught by applicants' admitted prior art.

Re claims 9 and 13, the Takeuchi reference discloses ten conventional examples for Si-N bonds at the interface between the second gate insulating film and the floating gate electrode (col. 4, line 8 - col. 5, line 29) wherein example (8) teaches that silicon oxide film is formed and is annealed in a nitrogen-containing gas then a silicon nitride film is formed on the silicon oxynitride film (col. 5, lines 11-18).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to apply further the steps of Takeuchi into the above combination of Hisamune with applicants' admitted prior art process. The use of silicon oxide film containing nitrogen and a silicon nitride film as the insulating film is well known to those skilled in the art as taught by Takeuchi.

Re claims 11 and 15, the critical concentration of $5 \times 10^{13} \text{ cm}^{-2}$ of nitrogen in the interface of silicon oxynitride film with the silicon substrate would have been an obvious matter of design choice bounded by well known manufacturing constraints and ascertainable by routine experimentation and optimization to choose these particular concentration to overcome applicants' admitted prior art's constraint (specification's page 21), and it appears that the process would possess utility using this concentration.

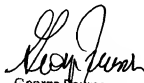
Conclusion

3. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.
4. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Thanh V. Pham whose telephone number is 703-308-2543. The examiner can normally be reached on M-T (6:30-5:00).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Olik Chaudhuri can be reached on 703-306-2794. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.

TvP
TvP
11/05/03


George Pourson
Primary Examiner